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DRAFT MEMORANDUM

To: Gary Miller — **Date:** September 14, 2011
U.S. Environmental Protection Agency

From: Jennifer Sampson, Integral Consulting Inc.
David Keith, Anchor QEA, LLC

Cc: March Smith and Andrew Shafer, McGinnes Industrial Maintenance Corporation
Philip Slowiak, International Paper Company

Re: Draft Addendum 1 to the Sediment Sampling and Analysis Plan (SAP) for additional upstream sediment sampling, San Jacinto River Waste Pits Superfund Site

INTRODUCTION

This draft memorandum is an addendum to the Sampling and Analysis Plan (SAP) for the Sediment Study at the San Jacinto River Waste Pits (SJRWP) Superfund site (Site) (Integral and Anchor QEA 2010), and is submitted on behalf of International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC) (collectively referred to as Respondents), pursuant to the requirements of Unilateral Administrative Order (UAO), Docket No. 06-03-10, which was issued on November 20, 2009 (USEPA 2009). The UAO requires Respondents to conduct a Remedial Investigation/Feasibility Study (RI/FS) for the Site.

This draft addendum to the Sediment SAP (Integral and Anchor QEA 2010) was prepared following a discussion of data gaps that were identified in the draft Preliminary Site Characterization Report (PSCR), submitted to the U.S. Environmental Protection Agency (USEPA) on July 20, 2011 (Integral and Anchor QEA 2011). In addition to the text of the PSCR, a summary of the data gaps for both tissue and sediment chemistry in background areas was submitted to USEPA and discussed in a meeting on August 30, 2011. A summary of the data gaps is included here as Attachment A. Attachment A provides the data analysis

that supports the data quality objectives (DQOs) for additional sediment sampling specified below.

In addition to addressing the DQOs for upstream sediment sampling, this draft addendum provides for all quality assurance and quality control (QA/QC) procedures that will be applied during the sediment sampling, analysis, data validation, and reporting. Sampling described by this addendum will be conducted in full compliance with the approved Sediment SAP (Integral and Anchor QEA 2010) and related appendices (including the Field Sampling Plan, which is Appendix A to the Sediment SAP). Only those aspects unique to the upstream sediment sampling to be conducted in October of 2011 are addressed by this document.

STATEMENT OF THE PROBLEM

The upstream sediment dataset collected to represent Site-specific background does not reflect the full range of percent fines (i.e., sum of percent clay and percent silt) and percent carbon that characterize the sediments on the Site (Attachment A, Figures 6 and 7). These two physicochemical parameters in sediments tend to correlate positively with chemical concentrations in general (Bethke 2008) and on the Site (Attachment A). As a result, the available background data set may not reflect the full range of dioxin and furan concentrations in the actual background environment. The problem to be addressed by additional upstream background sediment sampling that specifically targets sediments with fines of 50 percent or greater is that the range of dioxin and furan concentrations in the existing background data set may be biased low because the original sampling effort did recognize the need to match the distributions of physicochemical drivers of chemical concentrations in sediments in Site and background sediment datasets.

Because of the importance of the background sediment data in the RI/FS for risk analysis, the fate and transport modeling, and in risk management and remedial action decision-making for the Site, the differences between the existing upstream sediment data set and the on-Site sediment data indicate an important data gap for the RI/FS. The purpose of additional sampling for sediments in the upstream background area is to describe dioxin and furan concentrations in background sediments characterized by a grain size distribution consisting of greater than 50 percent fine sediments to address this data gap.

ANALYSIS OF EXISTING INFORMATION AND SELECTION OF ANALYTES

Attachment A summarizes the analysis of existing data that supports further efforts to characterize the upstream background sediment condition.

Dioxin and furan concentrations, grain size distribution, and percent organic carbon will be analyzed in the additional sediment samples to be collected upstream of the Site (Figure 1). Because dioxins and furans are the indicator chemical group on the Site (Integral and Anchor QEA 2010), and because they are the most likely risk driver on the Site, they are the most important chemical analytes for this effort. In addition, measurement of grain size distribution is necessary to ensure that the sampling objective of targeting sediments within a specific grain size distribution range has been met. Measurement of percent carbon is necessary to ensure compatibility with the overall sediment data set and its uses in the RI/FS, which may include expression of dioxin and furan concentrations in organic carbon-normalized units.

PROJECT ORGANIZATION, METHODS, AND QUALITY ASSURANCE PROCEDURES

Sediment sampling and analyses described in this draft addendum will be conducted in full compliance with the Sediment SAP (Integral and Anchor QEA 2010) and related appendices (including Appendix A, the Field Sampling Plan), in the context of the objectives that are relevant to this task. The Sediment SAP describes the means to achieve all QA/QC requirements and documentation articulated by USEPA's guidance for preparation of quality assurance project plans and field sampling plans (USEPA 1998, 2001); these specifications will be applied to the collection, analysis, QA review, data management, validation, and reporting of the information generated as described in this draft addendum. Sampling personnel will comply with the overall Health and Safety Plan (HSP) (Anchor QEA 2009) and Addendum 1 to the overall HSP that is provided in Appendix A of the Sediment SAP (Integral and Anchor QEA 2010, Appendix A, Attachment A1).

The sediment analytes, the method reporting limits, and method detection limits for dioxins and furans and for method detection limits are listed in Table 1.

DATA QUALITY OBJECTIVES

This section provides a summary of the DQOs for the proposed upstream sediment sampling, inclusive of the objective of the task, analytical approach, and sampling locations.

Sampling Objective

The approach to additional upstream sediment sampling, which targets sediments with a grain size distribution characterized by a fraction of fines greater than 50 percent, was developed in consideration of the following:

- The patterns in grain size distribution and percent organic carbon of sediments from within the preliminary Site perimeter relative to the patterns in grain size distribution and percent organic carbon in the upstream background sediment data set.
- The statistically significant and positive correlation of TEQ_{DF} with the percent fines in sediments, both on the Site and in sediments generally (Bethke 2008).

The objective of sampling is to obtain 10 samples of sediment that will allow characterization of TEQ_{DF} concentrations in the upstream background environment for the full range of grain size distributions that is apparent in sediments collected on the Site.

Analytical Approach

The sampling program will specifically target sediments with a grain size distribution characterized by fines between 50 and 80 percent. Samples will be collected from at least 20 locations. These sampling locations will be selected in consultation with USEPA during the field sampling and will be targeted to meet the goal of obtaining sediment with the appropriate grain size distribution (i.e., in areas expected to be depositional within the upstream background area) (Figure 1). A wet sieve field screening test may be employed to help select the appropriate sediments to submit for analysis, at the discretion of the field team. If needed, the screening will be conducted according to the method described in Attachment B. Twenty samples will be collected at the required volume for all analyses, and all samples submitted to the lab will be analyzed for percent fines. From those 20 samples that have 50 to 80 percent fines, a subset of 10 samples will be selected for analysis of dioxins and furans and percent organic carbon. If 10 samples with the targeted grain size distribution of 50 to 80 percent fines are not successfully collected, only those with the

appropriate grain size will be analyzed for dioxins, furans, and percent carbon. The subset of 10 (or fewer) will be selected to span the range of percent fines from 50 to 80 as evenly as possible.

Information on sample containers, preservation, and holding time requirements are provided in Table 2.

Analytical results for grain size distribution, organic carbon content, and dioxins and furans (Table 1) will be added to the background dataset for sediments and used as described in the DQOs for the Sediment SAP and as appropriate to tasks described in the RI/FS Work Plan.

Sampling Locations and Depth

Locations for collection of samples will be determined in the field, in consultation with a representative of USEPA who will attend the sampling event. All sample locations will be within the same upstream area sampled for the initial sediment sampling program, as illustrated in Figure 1. Sampling locations will be targeted for the purposes of obtaining finer-grained materials, with consideration and avoidance of known point sources of dioxins and furans, such as stormwater or wastewater outfalls. Sample depth will be from 0 to 15 cm, as for all surface sediment grabs collected for the SJRWP RI/FS program.

Timing of Sampling and Reporting

Sampling will be conducted following approval of this SAP Addendum, and concurrently with or immediately before or after tissue sampling in the same upstream area. Sampling is expected to be performed in the first 10 days of October, 2011. If sampling is complete by October 10, 2011, validated analytical results are expected to be available and loaded to the project data base by December 15, 2011.

Sample Collection Matrix

Table 3 provides a checklist of samples for use in the field during sampling. It is analogous to Table A-3 in Appendix A of the Sediment SAP (Integral and Anchor QEA 2010).

REFERENCES

Anchor QEA, 2009. Health and Safety Plan San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Anchor QEA, Ocean Springs, MS.

Bethke, C.M., 2008. Geochemical and Biogeochemical Reaction Modeling. Second Edition. Cambridge University Press, New York.

Integral and Anchor QEA, 2010. Sampling and Analysis Plan: Sediment Study San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. Integral Consulting Inc., Seattle, WA, and Anchor QEA, Ocean Springs, MS.

USEPA, 1998. EPA Guidance for Quality Assurance Project Plans. EPA QA/G-5. U.S. Environmental Protection Agency, Washington, DC.

USEPA, 2001. EPA Requirements for Quality Assurance Project Plans. EPA QA/R-5. EPA/240/B-01/003. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC.

USEPA, 2009. Unilateral Administrative Order for Remedial Investigation/Feasibility Study. U.S. EPA Region 6 CERCLA Docket No. 06-03-10. In the matter of: San Jacinto River Waste Pits Superfund Site Pasadena, Texas. International Paper Company, Inc. & McGinnes Industrial Management Corporation, respondents.

FIGURES

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Upstream Sediment Collection Area

USEPA's Preliminary Site Perimeter

0 1,000

Feet

Figure 1

Upstream Sediment Sampling Area

Sediment SAP Addendum 1

SJRWP Superfund/MIMC and IPC

TABLES

Table 1
Analytes, Method Reporting Limits, and Method Detection Limits for Sediment Samples

Analyte	CAS Number	Method Detection Limit	Method Reporting Limit
Conventionals			
Grain Size Distribution	--	NA	NA
Total organic carbon (percent)	--	0.02	0.05
Organics			
Dioxins/furans (ng/kg-dry weight)			
1,2,3,4,6,7,8-Heptachlorodibenzo-*p* -dioxin	35822-46-9	0.0539	5
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	0.0482	5
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	0.0561	5
1,2,3,4,7,8-Hexachlorodibenzo-*p* -dioxin	39227-28-6	0.0616	5
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	0.0688	5
1,2,3,6,7,8-Hexachlorodibenzo-*p* -dioxin	57653-85-7	0.0500	5
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	0.0489	5
1,2,3,7,8,9-Hexachlorodibenzo-*p* -dioxin	19408-74-3	0.0525	5
1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	0.0521	5
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	0.0501	5
1,2,3,7,8-Pentachlorodibenzo-*p* -dioxin	40321-76-4	0.0656	5
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	0.0490	5
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	0.0444	5
2,3,7,8-Tetrachlorodibenzo-*p* -dioxin	1746-01-6	0.0664	1
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	0.0726	1
Octachlorodibenzo-*p* -dioxin	3268-87-9	0.0990	10
Octachlorodibenzofuran	39001-02-0	0.0782	10
Total tetrachlorinated dioxins	41903-57-5	NA	1
Total pentachlorinated dioxins	36088-22-9	NA	5
Total hexachlorinated dioxins	34465-46-8	NA	5
Total heptachlorinated dioxins	37871-00-4	NA	5
Total tetrachlorinated furans	30402-14-3	NA	1
Total pentachlorinated furans	30402-15-4	NA	5
Total hexachlorinated furans	55684-94-1	NA	5
Total heptachlorinated furans	38998-75-3	NA	5

Notes

-- = information not available

NA = not applicable

Table 2
Sample Containers, Preservation, and Holding Time Requirements

Matrix	Container [a] Type	Size	Laboratory	Parameter	Preservation	Holding Time	Sample Size [b]
Sediment							
				TOC	4±2°C	28 days	1 g
	WMG	16 oz.	TBD	Grain size	4±2°C	6 months	100 g
	WMG	8 oz.	TBD	Dioxins/furans	4±2°C/Deep frozen (-20°C) [c]/ -10°C [d]	1 year/1 year [e]	50 g
Equipment Filter Wipe Blanks							
	AG	4 oz.	TBD	Dioxins/furans	4±2°C	1 year/1 year [e]	3 wipe

Notes

AG = amber glass
TBD = to be determined
WMG = wide mouth glass

a - The size and number of containers may be modified by the analytical laboratory.
b - Sample sizes may be modified one laboratory selection is made.
c - Samples will be shipped to the laboratory on ice at 4±2°C. Once received at the laboratory, samples will be stored at -20°C.
d - Extracts will be stored at -10°C.
e - Holding time for samples prior to extraction/ holding time for extracts.

Table 3
Field Sample Collection Matrix

								Upstream Sediment Sample Analyses			Blank Filter Wipes
											Whatman Grade 42 Filters
								TOC	Grain Size	Dioxins and Furans	Dioxins and Furans
								8 oz WMG[a]	16 oz WMG[a]	8 oz WMG[a]	4 oz WMG[a]
Station Number	Sample Identifier	Sample Number	Sample Depth	Sample Type	Approximate Number of Subsamples	Sample Group	Field Grain Size Test	4±2 ºC	4±2 ºC	4±2 °C/ Deep frozen (-20°C)[b]/-10 °C	4±2ºC
☐ SJUP001	SJUP001-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP002	SJUP002-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP003	SJUP003-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP004	SJUP004-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	2	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
	SJUP004-GR1-DUP	SD _ _ _ _	0-6 inches (0-15 cm)	Field Split[b]	NA	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP005	SJUP005-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP006	SJUP006-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP007	SJUP007-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP008	SJUP008-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP009	SJUP009-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP010	SJUP010-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP011	SJUP011-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP012	SJUP012-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP013	SJUP013-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	2	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP014	SJUP014-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP015	SJUP015-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP016	SJUP016-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA

Table 3
Field Sample Collection Matrix

								Upstream Sediment Sample Analyses			Blank Filter Wipes
											Whatman Grade 42 Filters
								TOC	Grain Size	Dioxins and Furans	Dioxins and Furans
								8 oz WMG[a]	16 oz WMG[a]	8 oz WMG[a]	4 oz WMG[a]
Station Number	Sample Identifier	Sample Number	Sample Depth	Sample Type	Approximate Number of Subsamples	Sample Group	Field Grain Size Test	4±2 ºC	4±2 ºC	4±2 °C/ Deep frozen (-20°C)[b]/-10 °C	4±2ºC
☐ SJUP017	SJUP017-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP018	SJUP018-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP019	SJUP019-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ SJUP020	SJUP020-GR1	SD _ _ _ _	0-6 inches (0-15 cm)	Surface grab	1	Upstream Background	% Fines_____	Tag #_____	Tag #_____	Tag #_____	NA
☐ FW Blank	UPFW-901S	FW _ _ _ _	Surface Sampling Equipment	Equipment filter wipe blank[c]	NA	NA		NA	NA	NA	Tag #_____
☐ Filter Paper	UPFB-902P	FB _ _ _ _	Filter paper	Filter blank[d]	NA	NA		NA	NA	NA	Tag #_____

Definitions

NA = not applicable
WMG = wide mouth glass

Note

A unique numeric sample tag number will be attached to each sample container. If the amount of material (i.e., everything associated with a single sample number) is too large for a single container, each container will have the same sample number and a different sample label with a unique sample tag number. A sample will also be split between containers if a different preservation technique is used for each container (e.g., freezing archive sample). The sample tag number will appear on the COC forms. Tag numbers are used by laboratories only to confirm that they have received all of the containers that were filled and shipped. Data will be reported by sample number.

From the above 20 samples that have 50 to 80 percent fines, a subset of 10 samples will be selected for analysis of dioxins and furans and percent organic carbon. If 10 samples with the targeted grain size distribution of 50 to 80 percent fines are not successfully collected, only those with the appropriate grain size will be analyzed for dioxins, furans, and percent carbon. The subset of 10 (or fewer) will be selected to span the range of percent fines from 50 to 80 as evenly as possible.

a - The size and number of containers may be modified by the analytical laboratory.

b - Blind field split samples will be collected at a minimum frequency of 1 field split sample per 20 sediment samples.

c - A filter wipe blank sample will be collected at a minimum frequency of 1 per 20 sediment samples. One equipment wipe will be prepared for each analysis type (i.e., dioxins/furans). Separate tests of filter wipes will be collected for each type for each kind of sampling equipment used, as the equipment can be wiped down only once with each piece of filter paper. This ensures that the filter wipe result represents the most conservative estimate of cross contamination for each analysis type.

d - Filter blanks are prepared in the field to evaluate potential background concentration present in filter paper used for the equipment filter wipe blank. Filter blanks will be collected at a minimum frequency of one for each lot number of filter papers used for collecting the equipment wipe blank. The filter lot number will be clearly noted in the field logbook.

ATTACHMENT A
SUMMARY OF RI/FS DATA GAPS AND SAMPLING PROPOSAL OUTLINE, SJRWP

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MEMORANDUM

To:	Gary Miller U.S. Environmental Protection Agency	**Date:**	September 7, 2011
From:	Jennifer Sampson, Integral Consulting Inc. David Keith, Anchor QEA, LLC		
Cc:	March Smith and Andrew Shafer, McGinnes Industrial Maintenance Corporation Philip Slowiak, International Paper Company		
Re:	Summary of RI/FS Data Gaps and Sampling Proposal Outline, San Jacinto River Waste Pits Superfund Site		

INTRODUCTION

This memorandum presents a summary of the data gaps for the San Jacinto River Waste Pits (SJRWP) Remedial Investigation/Feasibility Study (RI/FS) that were identified in the draft Preliminary Site Characterization Report (PSCR) (Integral and Anchor QEA 2011), submitted to USEPA on July 20, 2011. This submittal contains greater detail in support of additional sampling, and provides conceptual outlines of sampling approaches that would address the data gaps. All new data would be added to the existing data set, and none of the existing data would be discarded or replaced. This memorandum is being submitted during USEPA review of the draft PSCR because it will be necessary to resolve the issue of data gaps and develop an approved, consensus sampling approach by the end of September 2011 so that sampling can occur in October 2011. This schedule is necessary both to meet USEPA's schedule for the RI/FS, and to obtain samples that are comparable to samples collected during the original RI/FS sampling programs.

The RI/FS is being conducted at the SJRWP Superfund site (the Site) pursuant to the requirements of Unilateral Administrative Order, Docket No. 06-03-10 (USEPA 2009). This memorandum is submitted on behalf of International Paper Company and McGinnes Industrial Maintenance Corporation (collectively referred to as Respondents).

SUMMARY OF DATA GAPS

The draft PSCR concludes that the Site-specific background datasets for tissue and sediment are incomplete, and provides supporting rationale. The related text of the PSCR is excerpted below for tissue and sediment. Additional details are also presented below for both tissue and sediment that support the finding of the PSCR that these background data sets are incomplete.

The objective of additional sampling described in this memorandum is to accurately characterize the background condition. The Site-specific background dataset may have several uses in the RI/FS process, including the following:

- Comparison of Site-related and background risks, so that the incremental risk due to the Site can be accurately characterized
- Development of Preliminary Remediation Goals (PRGs), for which background concentrations in sediment, and even in tissue, may be a central consideration.

Both of these uses are fundamentally related to the same question: How much risk can be addressed by remediation at the Site? If the existing background dataset is insufficient to accurately characterize the actual background risk, or if background data is used to support development of a PRG that does not account for the other sources of chemicals of potential concern (COPCs), the final remedial goals for the site may be unrealistic and unachievable. To develop a successful remedial program, it is necessary to have an accurate representation of the background condition for both tissue and sediments.

Tissue Data Gaps

Toxicity equivalent concentrations of dioxins and furans (TEQ_{DF}) in catfish fillet and blue crab tissue collected from Cedar Bayou for the RI/FS are noticeably lower than concentrations in edible tissue of these species from any other study for the lower San Jacinto River and Upper Galveston Bay in the RI/FS database. Section 6.2.2 of the draft PSCR reports on data from these other studies as follows:

> "The 151 samples of blue crab edible tissue collected by these studies had a range of TEQ_{DF} of 0.05 to 15.8 ng/kg, with a mean of 3.11 ng/kg and a 95th percentile at 8.86 ng/kg. These values are substantially greater than the

0.14 ng/kg TEQ_{DF} [reference envelope value, or REV] calculated for crab edible tissue collected from Cedar Bayou as part of the RI (Table 6-50). In fact, the maximum TEQ_{DF} for the crab samples from Cedar Bayou (0.113 ng/kg) was lower than the 10th percentile of these historical data collected by TCEQ and TDSHS throughout the San Jacinto and Galveston Bay system. The data for all other COPCs were also higher in the historical state datasets (where data for other COPCs were available) compared to crabs collected from Cedar Bayou; exceptions were aluminum, arsenic, and manganese, for which concentrations ranges were comparable between Cedar Bayou and the other offsite data, and magnesium and mercury, which had a larger range in Cedar Bayou compared to the historical offsite data.

Similar patterns were also observed for hardhead catfish fillet, with 81 measurements of TEQ_{DF} for samples collected from outside the preliminary Site perimeter, both upstream and downstream of the Site. These samples have a range of TEQ_{DF} between 0.40 and 16.0 ng/kg, with a mean of 5.7 and 95th percentile of 12.3 ng/kg, respectively. The maximum TEQ_{DF} concentration (0.389 ng/kg) for catfish samples from Cedar Bayou areas collected in the RI dataset (Table 6-52) is below the minimum value observed throughout the San Jacinto and Galveston Bay ecosystem in the historical data collected by state agencies."

To provide a more detailed perspective on these differences, tissue concentrations of dioxins, furans, and polychlorinated biphenyls (PCBs) in tissue samples from Cedar Bayou and from the reach of the San Jacinto River downstream of the confluence with Buffalo Bayou to Morgan's Point (Area SJFCA5, Figure 1) were further evaluated for this data gaps memorandum. Specifically, data collected from SJFCA5 by the Texas Commission on Environmental Quality (TCEQ) for the Total Maximum Daily Load (TMDL) program, and the Texas Department of State Health Services (TDSHS) data from 2002 and onward, were evaluated relative to the RI/FS data for Cedar Bayou. TCEQ and TDSHS sampling locations within SJFCA5, an alternative background sampling area considered in the Tissue Sampling and Analysis Plan (SAP) (Integral 2010), are shown in Figure 1.

The area in SJFCA5 was proposed as a background sampling area in the Tissue SAP to include in the characterization of background conditions the important influence of non-Site sources of COPCs on exposures of aquatic species that may range widely beyond the Site, even if they are captured on the Site. Because little is known about the specific movements and home ranges of blue crabs and hardhead catfish captured at the Site, it is uncertain what the concentrations of COPCs in edible tissues would be if the Site did not exist. Although this characterization is never completely attainable, sampling edible tissue of highly mobile species from areas known to be influenced by a wide range of urban COPC sources provides a valuable perspective on that uncertainty.

Simple comparisons of data from Cedar Bayou with data from SJFCA5 using the 2,3,7,8-tetrachlorinated dibenzo-*p*-dioxin (TCDD) toxicity equivalent (TEQ) calculated with dioxins and furans only (TEQ_{DF}) or with dioxin-like PCBs only (TEQ_P) are presented in the attached Figures 2 through 5. These illustrations show data for individual samples and aggregate statistics for TEQ_{DF} and TEQ_P in edible blue crab (Figures 2 and 3, respectively) and TEQ_{DF} and TEQ_P for hardhead catfish fillet (Figures 4 and 5, respectively). These figures clearly illustrate that the concentrations of TEQ_{DF} and TEQ_P in these two tissue types from Cedar Bayou are not representative of those in the general area. In all cases, the TEQ_{DF} or TEQ_P concentration in tissue from Cedar Bayou is statistically significantly lower than the concentrations in the corresponding tissue from SJFCA5 (Mann-Whitney-Wilcoxon, $p < 0.05$), consistent with the analysis presented in the draft PSCR, and excerpted above.

Although USEPA and its partner agencies may have expressed some concerns during discussion of the Tissue SAP that tissue in SJFCA5 is affected by the Site, the unmixing analysis presented in the draft PSCR indicates that dioxin and furan contamination of sediments that can be attributed to the paper mill wastes in the impoundments north of I-10 is localized to the Site. The unmixing results strongly suggest that a significant influence of the paper mill wastes on sediment and biological tissue several miles away is highly unlikely. The unmixing results support the use of SJFCA5, at least in part, as a source of data to characterize the regional background condition.

Based on the analysis presented in the PSCR and above, it is evident that the blue crab and hardhead catfish data from Cedar Bayou present a picture of background that does not reflect

the influence of important, non-Site-related regional sources of dioxins, furans, and PCBs on tissues elsewhere in the San Jacinto River and Galveston Bay system. Therefore, relying only on the Cedar Bayou tissue data for the Site-specific background in the SJRWP RI/FS will underrepresent the extent to which several receptors can be exposed to COPCs that are not attributable to the Site. This type of error could lead to development of unrealistic and unattainable remediation goals for the Site.

Sediment Data Gaps

The upstream sediment dataset collected to represent Site-specific background does not reflect the full range of percent fines and percent carbon, two physicochemical parameters in sediments that tend to correlate positively with chemical concentrations (Section 6.2.1, draft PSCR). The draft PSCR describes this problem as follows:

> "In the RI sediment dataset, there is a statistically significant correlation[1] between percent fines (as clay plus silt) and TEQ_{DF} (Figure 6-18). Although only 39 percent of the variability of the TEQ_{DF} concentrations is explained by sediment fines, the relationship is both statistically significant and positive. Importantly, Figure 6-18 shows that about half of the range of percent fines in the sediment dataset is not reflected in the background data. Sediments with fines at greater than 50 percent are absent from the background dataset.
>
> To determine whether this was just a reflection of the particle sizes within the impoundments north of I-10, box-whisker plots of grain size in sediments collected from 1) within the impoundments, 2) on the Site but outside of the 1966 impoundment perimeter, and 3) in the upstream background area were generated (Figure 6-19). The organic carbon content of these three compartments was also compared using box plots (Figure 6-19) ... Figure 6-19 strongly suggests that ranges of percent fines and organic carbon content in Site sediments are not fully represented by the upstream background dataset. The maxima and the medians of both the percent organic carbon and the

[1] Correlation of fine sediment (clay and silt) vs. TEQ_{DF}: $R^2=0.39$, $p < 0.05$

percent fines are lower in the upstream (background) sediment dataset than in the sediments that are on the Site but not within the impoundments."

Figures 6-18 and 6-19 from the draft PSCR are included here as Figures 6 and 7, respectively, to illustrate these differences. In addition, statistical comparisons indicate that both the total organic content and the percent fines of the upstream sediment dataset are statistically significantly lower than in the sediments collected from within the preliminary Site perimeter and from within the northern impoundments themselves (Mann-Whitney-Wilcoxon, $p < 0.05$). This discussion in the draft PSCR concludes that "it appears that the upstream background sediment dataset, in terms of the objective physical characteristics that tend to correlate with the concentrations of organic compounds, are not representative of conditions on the Site. The existing upstream sediment dataset may therefore underestimate the concentrations of dioxins and furans in background sediments."

As for the background tissue dataset, the upstream sediment dataset misrepresents the actual background condition. In the event that the existing Site-specific background sediment data provide a focal point for remedial goals, there is a substantial risk that these goals will be unrealistic and unattainable.

OUTLINE OF PROPOSED SAMPLING

A relatively limited sampling program can be conducted to resolve these two data gaps. This program would consist of collection of edible blue crab and catfish fillet samples from both upstream of the Site and at the southern extent of SJFCA5, and additional sediment sampling within the upstream background area. A few details are provided below for the proposed tissue and sediment sampling; we anticipate that additional specifics will be addressed collaboratively with USEPA before any sampling begins. Please also note that we are not proposing that any of the existing Site-specific background data be removed or replaced. Additional sediment and tissue data would be used to augment the existing data sets.

Tissue Sampling

A general outline of the proposed additional background tissue sampling is as follows:

- Schedule: Early October 2011. This is necessary to make the data compatible with the existing dataset, so that it will be appropriate to aggregate the new data with the existing data.
- Location: The upstream background area, and the southern end of SJFCA5, to the south of the Fred Hartman Bridge. The area to be sampled upstream is the same area within which sediment samples have already been collected for the RI. The area within SJFCA5 was originally under consideration for background tissue sampling, as described in the Tissue SAP. Tissue collected from this area will also better reflect COPC sources other than the Site in the tissues of mobile species within the San Jacinto River and Galveston Bay system. It is therefore a logical place to consider additional sampling. The specific sampling area within SJFCA5 will be limited to waters downstream, or south, of the Fred Hartman Bridge but still within SJFCA5.
- Tissues: Edible crab and catfish fillet. Ingestion of fish and crabs captured on the Site is a likely driver of risk to people. The background condition for these two tissue types is the most important data gap that needs to be addressed to effectively characterize incremental risks due to the Site. Ten samples of each tissue type consisting of composites from at least three individuals will be collected. Up to one-half of these will be taken from the area upstream of the Site, and the other half from the designated area within SJFCA5. Because the spatial distribution of catfish is somewhat dependent upon salinity, and the area upstream of the Site can contain substantial amounts of freshwater, catfish will be sampled for 3 days, or until 15 hardhead catfish (for 5 composites) of the appropriate size can be captured, whichever is less.
- Analytes: Dioxins and furans, percent lipid. The TMDL program has generated dioxin and furan tissue data for these tissues, but the most recent of these data were collected in 2004, and may therefore not represent current conditions. Whether the data for PCBs in tissue, which have been generated more recently (2008–2009), can be upgraded to Category 1 is under evaluation, but it is currently anticipated that no additional data for PCBs will be necessary.

Sediment Sampling

A general outline of the proposed sampling for additional sediment data is as follows:

- Schedule: Concurrent with or immediately following the tissue sampling.
- Location: In the approved upstream background area.
- Analytes: Dioxins and furans, grain size distribution and organic carbon content.
- Approach: The sampling program would specifically target sediments with a grain size distribution characterized by fines (clay plus silt) between 50 and 80 percent. Samples would be collected from 20 locations, selected in consultation with USEPA during the field sampling. Sampling locations would be targeted to meet the goal of obtaining sediment with the appropriate grain size distribution, and a field screen using a wet sieve may be employed to help select the appropriate sediments to submit for analysis. All samples submitted to the lab will be analyzed for percent fines. From those that have 50 to 80 percent fines, a subset of 10 will be selected for analysis of dioxins and furans. The results would be added to the background dataset for sediments.

CONCLUSION

Based on the evaluation of RI/FS data gaps for the SJRWP Site presented in the PSCR, and the additional analysis presented in this memorandum, concentrations of COPCs in catfish and crab tissue reported for Cedar Bayou are lower than for other areas of the San Jacinto River and Galveston Bay system that have not been influenced by releases from the Site. This is particularly evident for dioxins and furans. In addition, the upstream sediment dataset collected for the RI/FS does not reflect the full range of grain size distribution and organic carbon content present in sediments that are on the Site but outside of the 1966 impoundment perimeter. As a result, the range of background dioxin and furan concentrations that is relevant for comparisons with the Site may not be fully reflected in the available tissue and sediment background datasets. These differences represent important data gaps for the RI/FS, because background conditions may become an important consideration in risk management and remedial action decision-making for the Site. Implementation of a supplemental tissue and sediment sampling program as outlined above will address these data gaps in conformance with the requirements of the Unilateral Administrative Order for the RI/FS at the Site.

REFERENCES

USEPA, 2009. Unilateral Administrative Order for Remedial Investigation/Feasibility Study. U.S. EPA Region 6 CERCLA Docket No. 06-03-10. In the matter of: San Jacinto River Waste Pits Superfund Site Pasadena, Texas. International Paper Company, Inc. & McGinnes Industrial Management Corporation, respondents.

FIGURES

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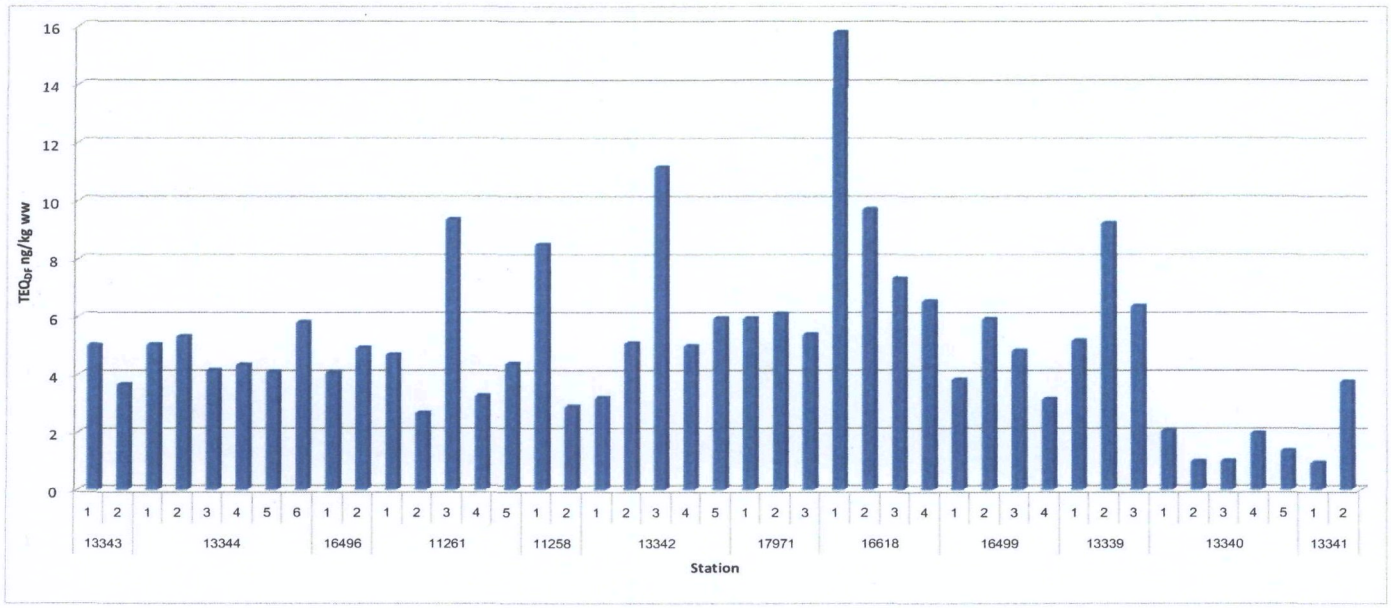
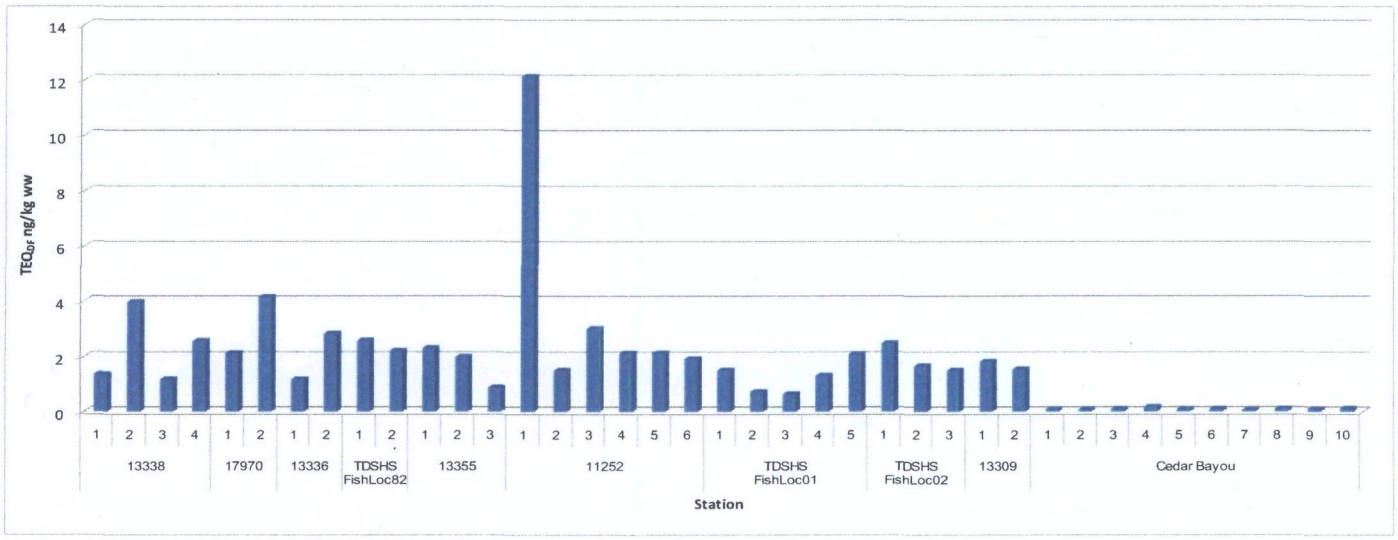
Miles

TDSHS Sample Stations
- Analyzed for Dioxins and Furans

TCEQ Sample Stations
- Analyzed for Dioxins and Furans and PCBs
- SJFCA5
- Cedar Bayou
- Preliminary Site Perimeter

Figure 1
Sampling Locations for Catfish and Blue Crab Analyzed for Dioxins, Furans, and PCBs by TCEQ and TDSHS
Data Gaps Memorandum
SJRWP Superfund/MIMC and IPC





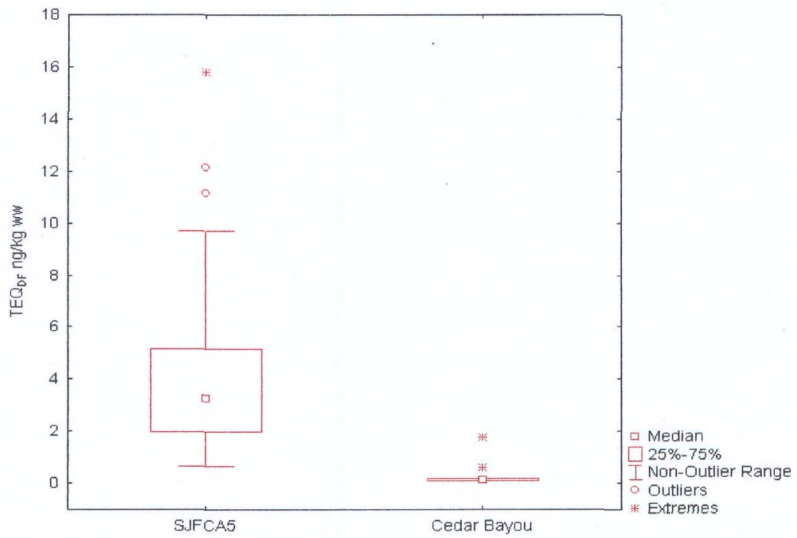
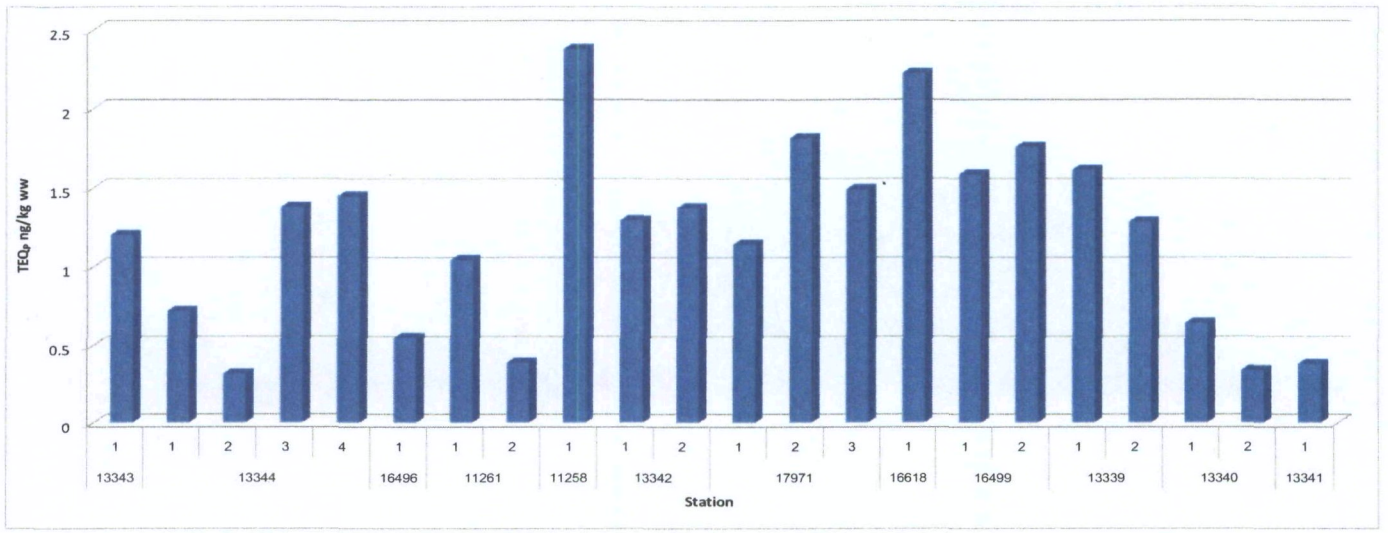
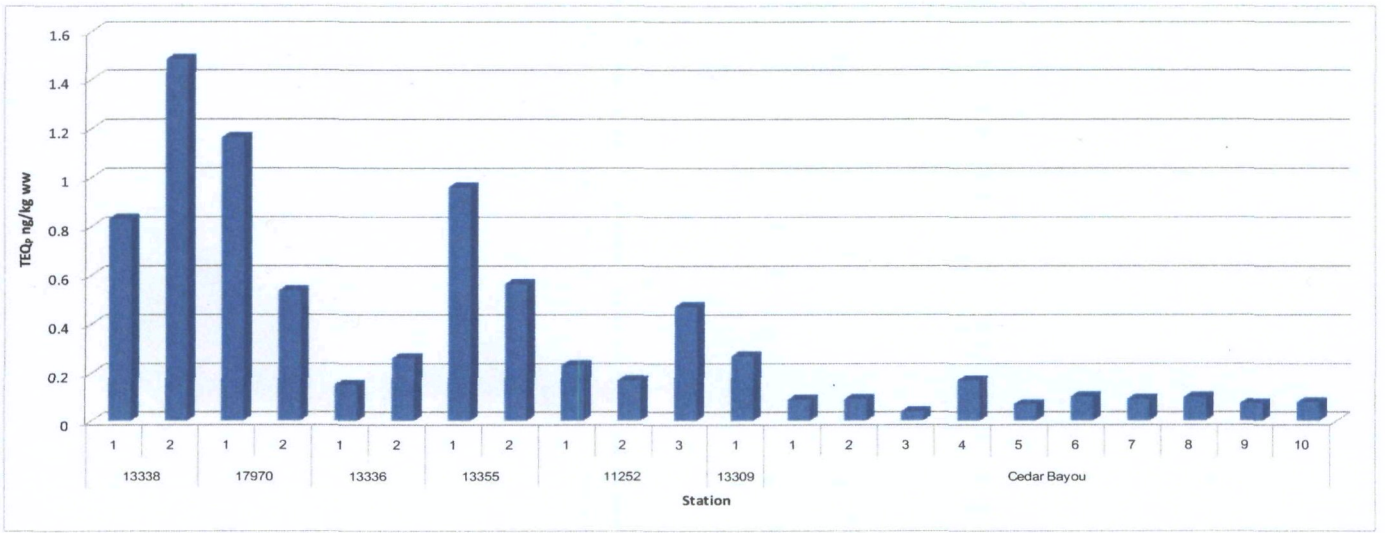


Figure 2
TEQ_{DF} Concentration in Edible Blue Crab Tissue from SJFCA5 and Cedar Bayou
Data Gaps Memorandum
SJRWP Superfund/MIMC and IPC





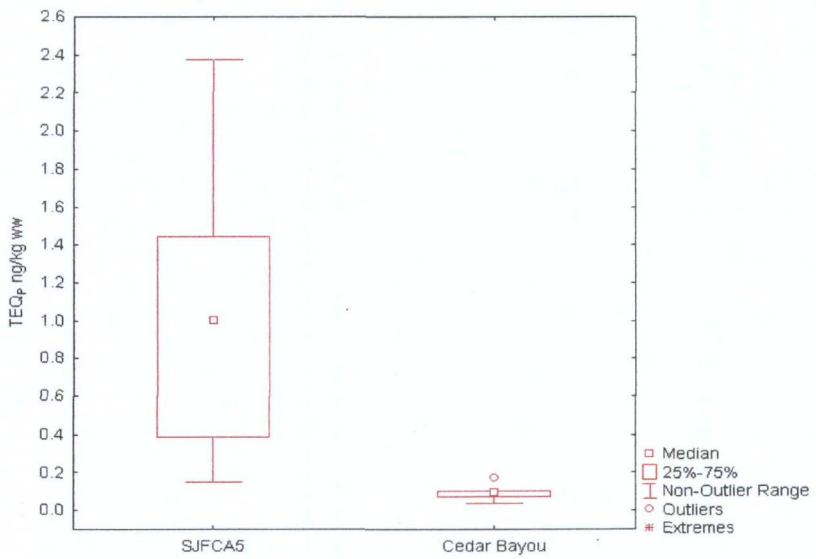
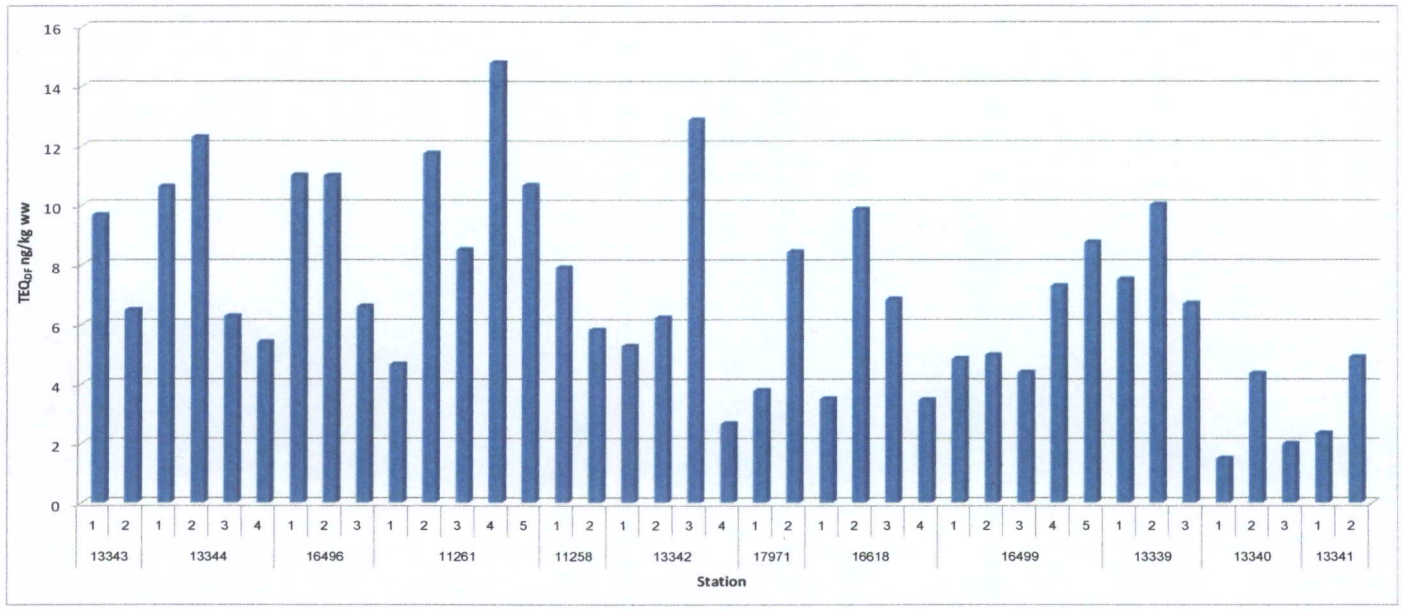
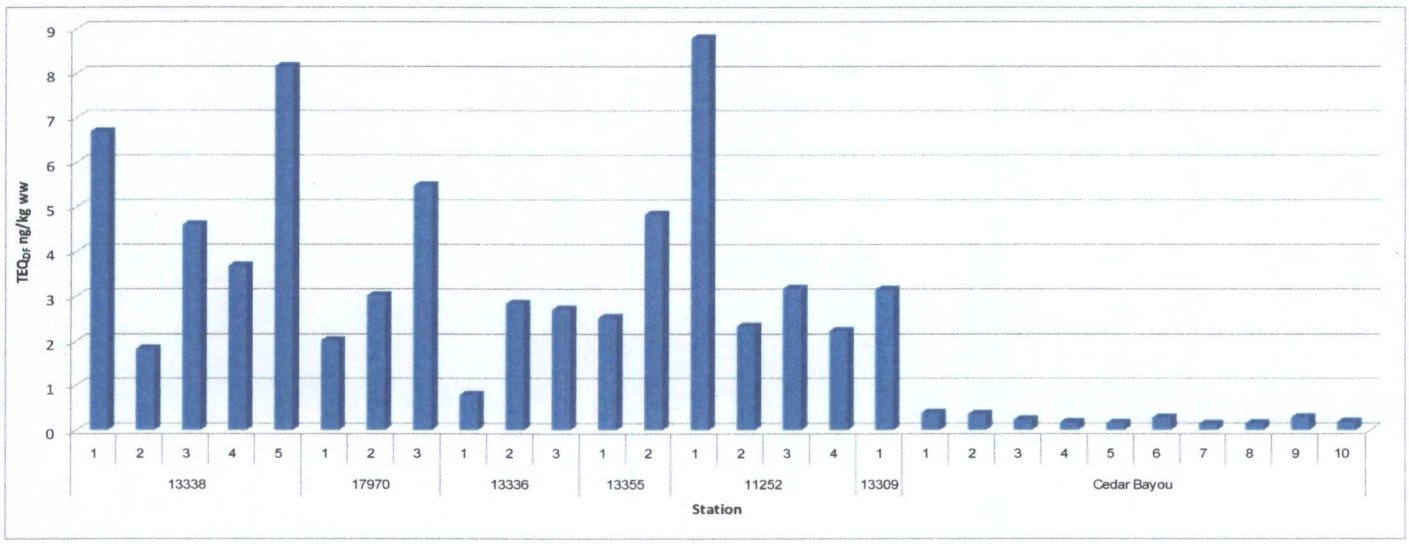


Figure 3
TEQ_p Concentration in Edible Blue Crab Tissue from SJFCA5 and Cedar Bayou
Data Gaps Memorandum
SJRWP Superfund/MIMC and IPC





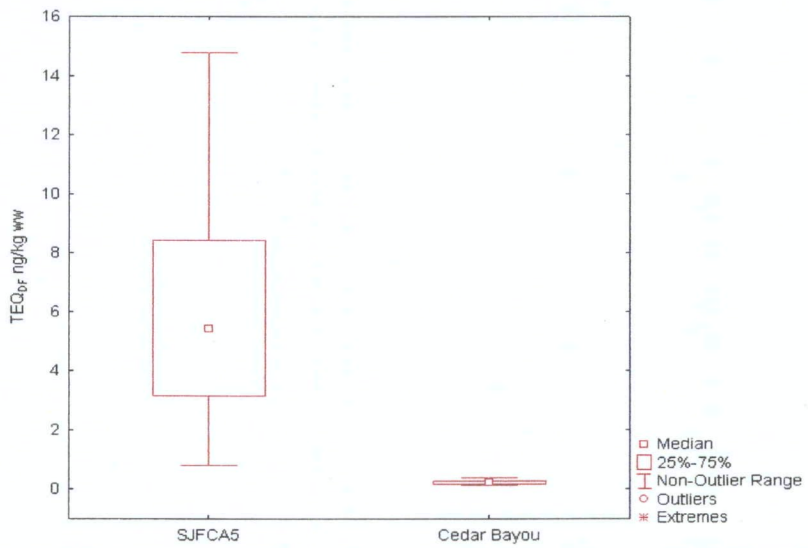
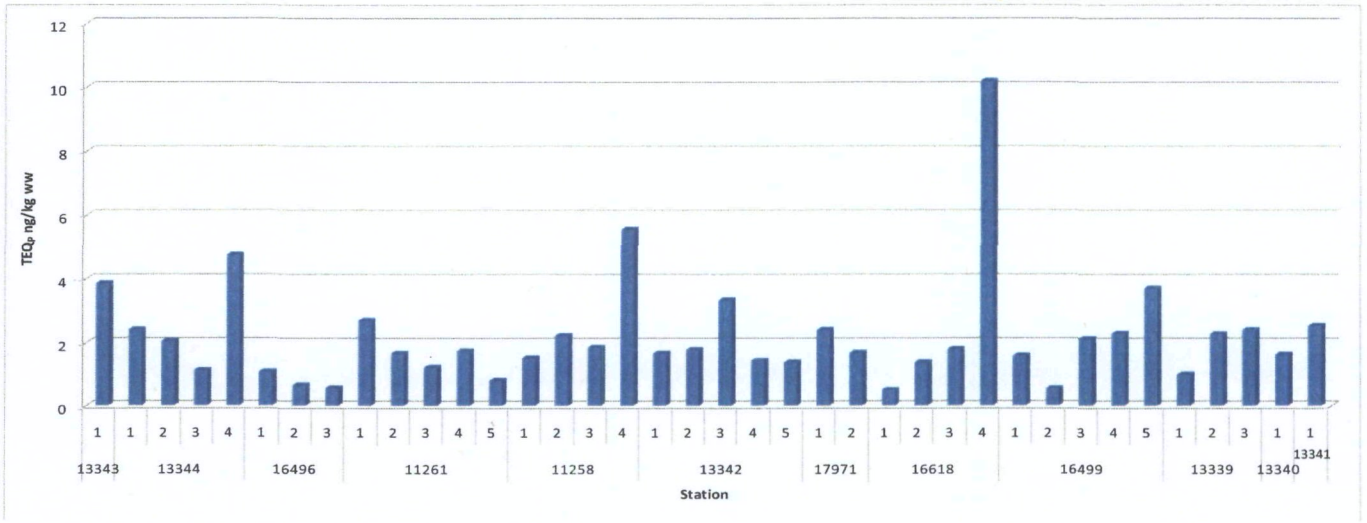
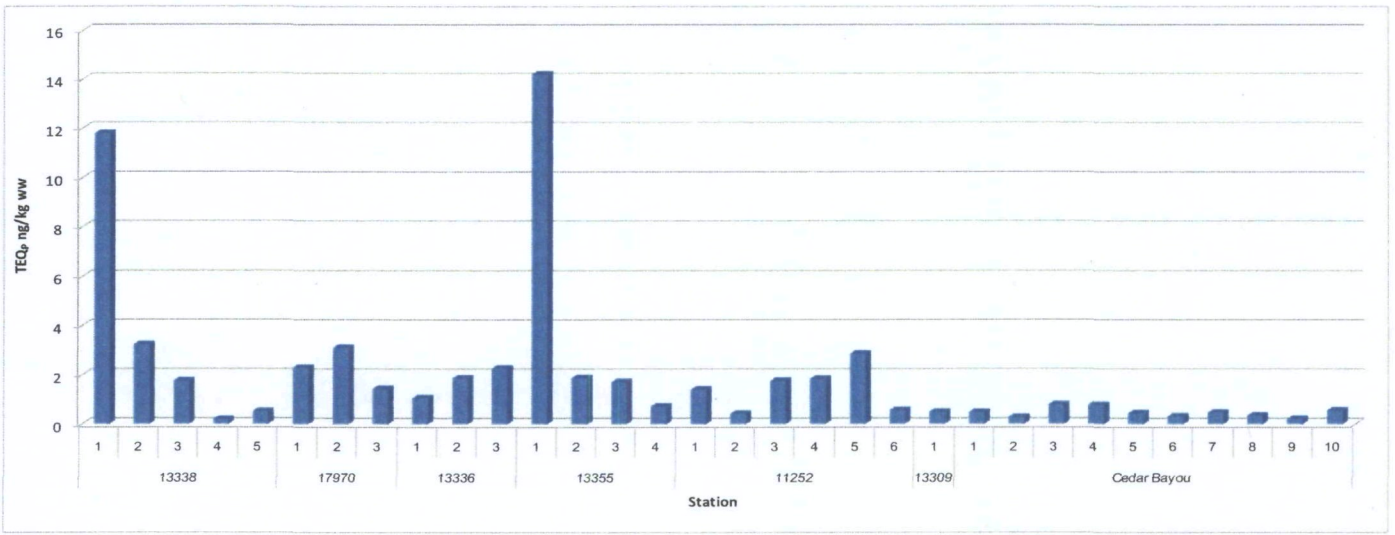


Figure 4
TEQ_{DF} Concentration in Hardhead Catfish Fillet from SJFCA5 and Cedar Bayou
Data Gaps Memorandum
SJRWP Superfund/MIMC and IPC





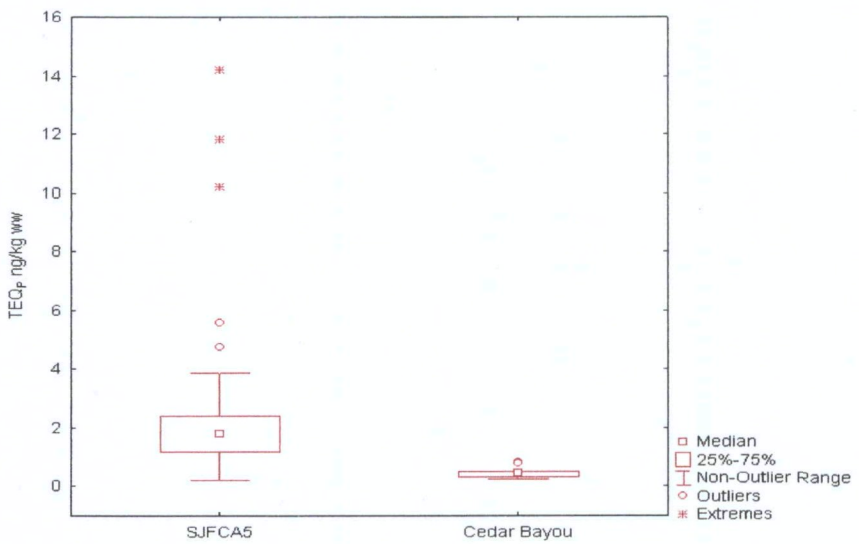


Figure 5
TEQ_p Concentration in Hardhead Catfish Fillet from SJFCA5 and Cedar Bayou
Data Gaps Memorandum
SJRWP Superfund/MIMC and IPC

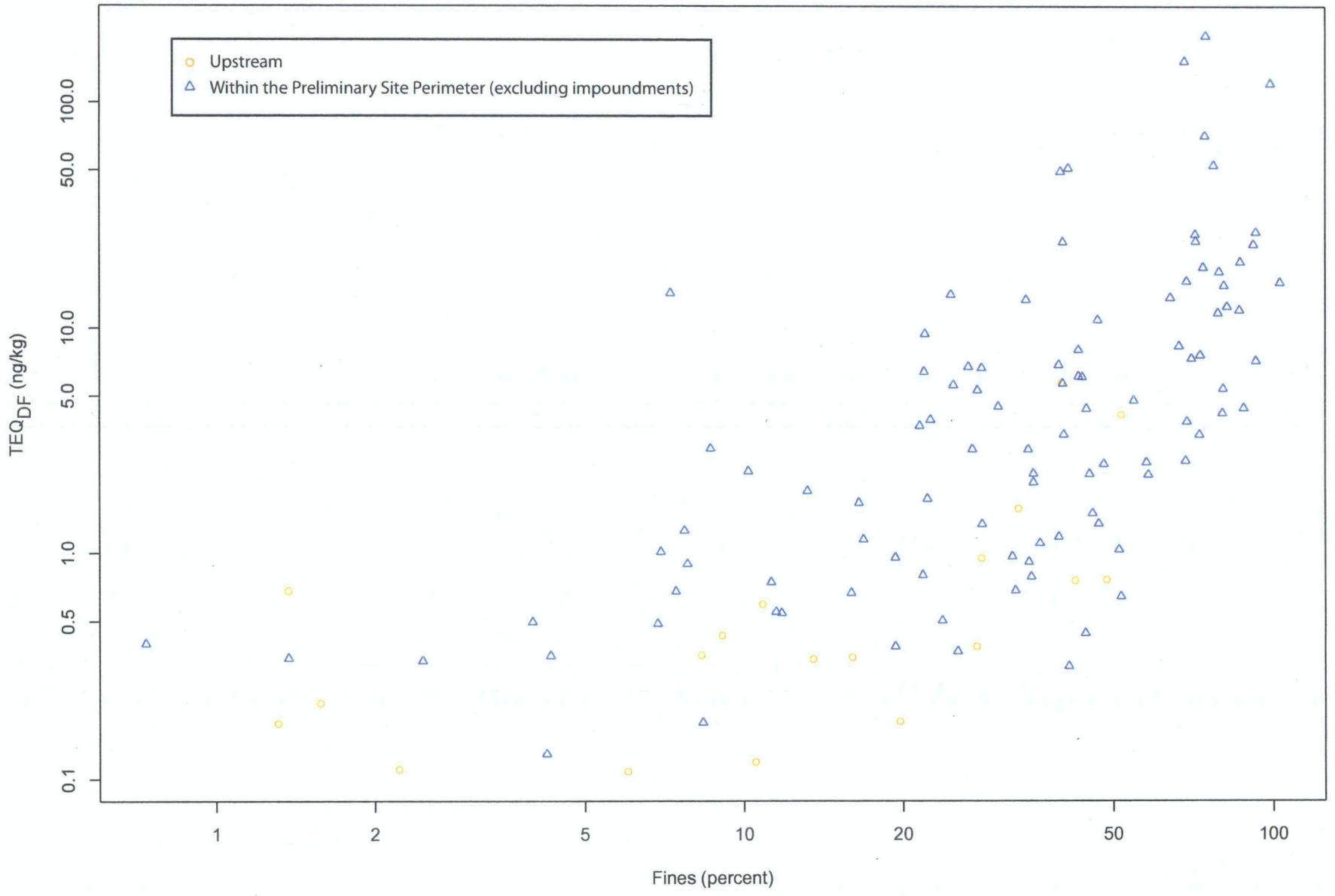


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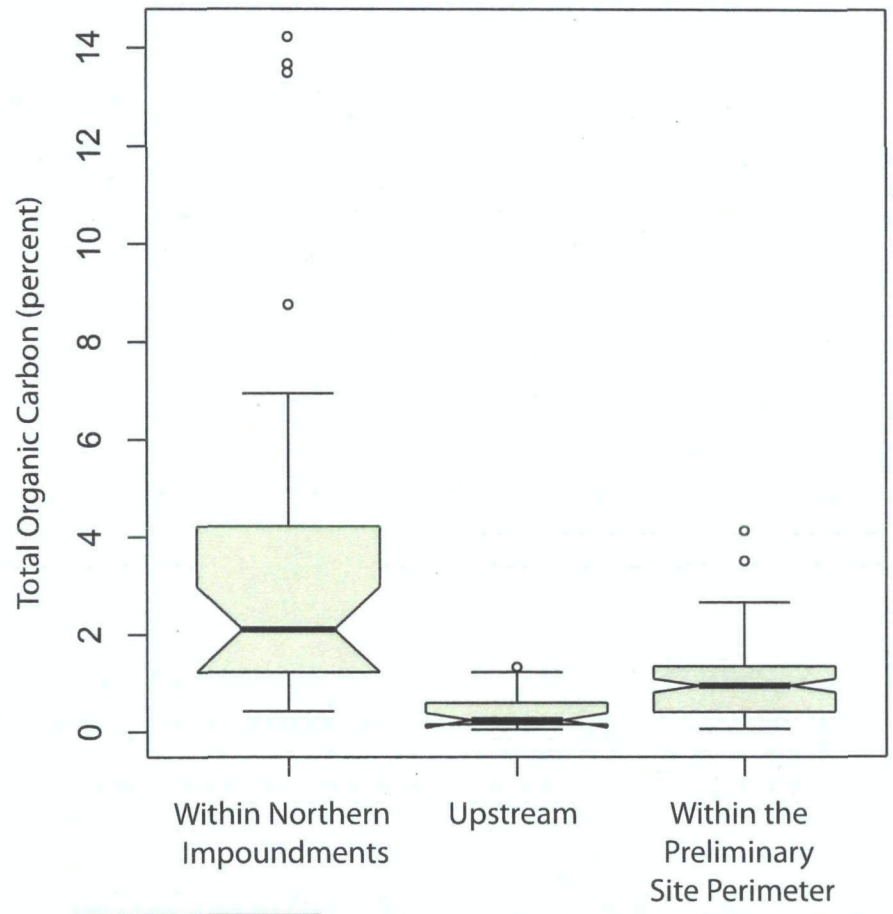
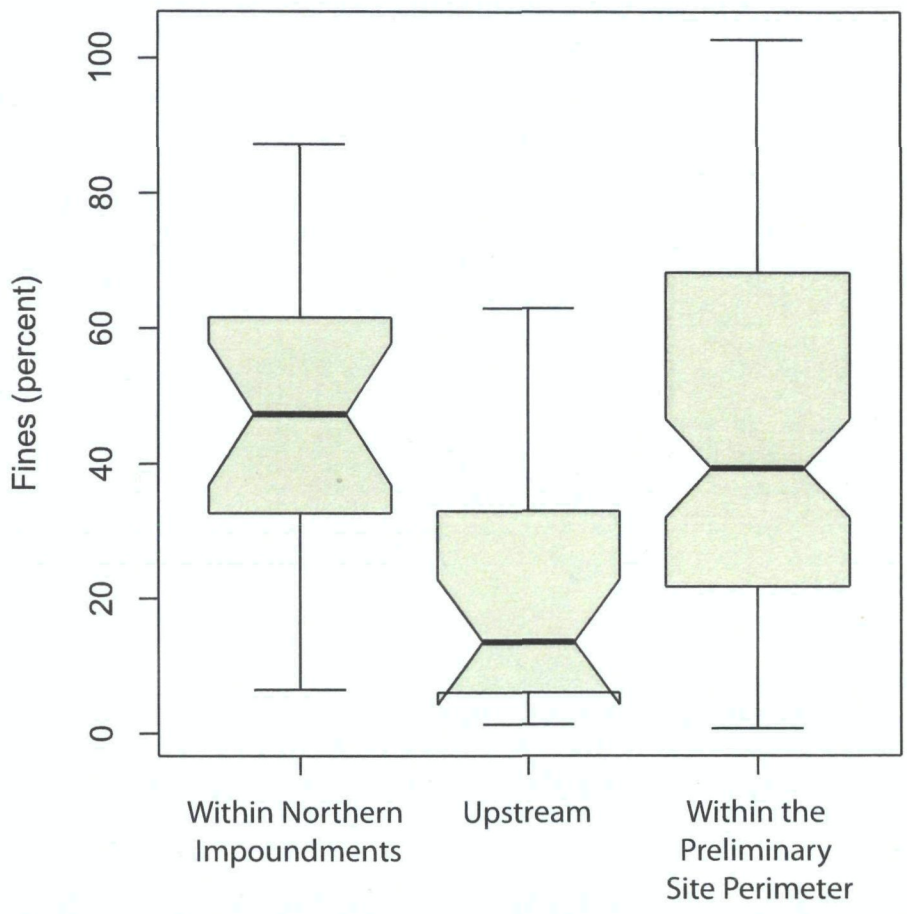
Figure 6
Relationship Between Fines (Clay + Silt) and TEQ_{DF} in Surface Sediment
Data Gaps Memorandum
SJRWP Superfund/MIMC and IPC





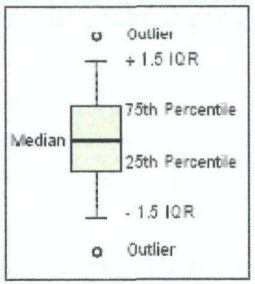


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Figure 7
Comparison of Total Organic Carbon and Fines among Samples Located within the Northern Impoundments, Upstream, and within the Preliminary Site Perimeter
Data Gaps Memorandum
SJRWP Superfund/MIMC and IPC

ATTACHMENT B
FIELD ANALYSES FOR SEDIMENTS SOP

STANDARD OPERATING PROCEDURE (SOP) SD-11

FIELD ANALYSES FOR SEDIMENTS

SCOPE AND APPLICATION

Several physical and chemical sediment parameters are best measured in the field because of the unstable nature of the parameter, or because the information is needed to direct further sampling. Four sediment field parameter measurements are described in this SOP: percent fines, pH, redox potential, and interstitial salinity.

PERCENT FINES

This procedure provides a gross field measurement of percent fines in a sediment sample. This field measurement is not intended to take the place of grain size distribution analysis in the laboratory, but to aid in directing collection of toxicity test samples and reference samples, which can be dependent upon percent fines.

Equipment and Reagents Required

Equipment required to perform this field measurement includes:

- USA Standard Testing Sieve #230 (63 μm opening)
- 50-mL measuring cup
- 100-mL graduated cylinder
- Small plastic funnel
- Teaspoon
- Squirt bottle filled with water.

Procedures

Once a sediment sample has been collected, carry out the following procedures:

1. Thoroughly rinse the sieve and all other equipment and visually inspect to ensure that no sediment or other detritus is present.

2. Collect a sediment aliquot from the grab sampler in the 50-mL cup, ensuring that exactly 50 mL is collected by "shaving" excess sediment from the top of the cup and rinsing any sediment off the sides of the cup.
3. Transfer the sediment aliquot from the 50-mL cup to the sieve using the spoon. Thoroughly rinse the cup and the spoon into the sieve with water to ensure that the entire aliquot has been transferred.
4. Gently rinse the sieve with running water and observe the stream of water coming from the bottom of the sieve. During this step, the fines are being rinsed away. Rinse until the stream of water appears clear, which indicates that all fines have passed through the sieve. Gently rinse the remaining sediment to one side of the sieve.
5. Place the plastic funnel into the 100-mL graduated cylinder and position the lip of the sieve over the funnel. Using the squirt bottle, rinse the sediment into the graduated cylinder, directing the stream of water through the back of the sieve. Continue rinsing until all sediment has been transferred to the graduated cylinder. If needed, rinse any sediment that may have adhered to the funnel. The rinse water should not overflow the graduated cylinder. If it appears that the graduated cylinder will overflow before all sediment has been transferred, either discard the sample and repeat the entire procedure, or allow the cylinder contents to settle, pour out the overlying water when it is clear (making sure not to pour out any solids), and continue rinsing the sieve.
6. Allow the sediment to settle completely in the graduated cylinder and record the amount of sediment present. This measurement represents the *volume retained*. Also record any turbidity observed in the overlying water. The *volume retained* (in mL), subtracted from the original 50-mL aliquot, provides the volume that passed through the sieve, or *volume of fines* in 50 mL of sample. Multiplying this remainder by 2 gives the volume of fines in 100 mL, or *percent fines*. The formula can be stated as:

$$\text{Percent Fines} = (50\ \text{mL} - \text{Volume Retained in mL}) \times 2$$

pH

Sediment pH may be measured by two methods, depending on the type of pH probe that is used. When using either method, it is important to calibrate the pH meter prior to field use. The meter should be calibrated according to manufacturer's specifications with at least two buffers that will bracket the expected pH of the sediment samples. If the pH of a sediment sample falls outside the bracket of buffers in the initial calibration, the meter should be recalibrated with the proper buffers.

Sediment pH may be measured with a standard combination pH electrode by inserting the electrode directly into the sediment sample to a depth of approximately 2 cm. Record the measurement after the reading has stabilized. Standard combination pH electrodes are

sensitive and not very durable and care should be taken when inserting the electrode. An alternate method is described below.

A "soil" pH electrode contains a concentric ceramic junction above the reference contact. Sediment pH may be measured with this type of electrode as follows:

1. Collect approximately 5 g of sediment from the sample and place the aliquot in a small container such as a test tube.
2. Add approximately 5 mL of distilled water and mix completely.
3. Allow the mixture to settle for approximately 15 minutes.
4. Insert the electrode into the container so that the pH-sensitive bulb is immersed in the opaque sediment suspension and the reference contact remains in the relatively clear supernatant layer
5. Record the measurement after the reading has stabilized.

Rinse the electrode in distilled water after each use and store it in buffer between measurements.

REDOX POTENTIAL

Redox potential (or Eh) should be measured as soon as possible after sample collection due to the unstable nature of this parameter. Redox potential may be measured using a platinum electrode and combination pH/millivolt meter. The electrode is inserted directly into the sediment sample to a depth of approximately 2 cm. Record the measurement after the reading has stabilized.

The redox electrode should be calibrated prior to use with a solution of potassium ferrocyanide and potassium ferricyanide. Manufacturer's directions for preparation of the calibration solution are included with the electrode. This solution is poisonous and must be labeled, stored, and handled accordingly. Most electrodes should calibrate to a value near +192 millivolts using this calibration solution.

INTERSTITIAL SALINITY

The salinity of pore or interstitial water contained in a sediment sample may be measured directly in the field. An aliquot of the sediment sample is placed in a separate container not intended for chemical analysis and the sediment solids allowed to settle. The salinity of the overlying interstitial water may be measured directly using a salinometer. The salinometer should be calibrated prior to use according to manufacturers directions with a salinity standard of a concentration (in parts per thousand) close to that expected in the field. If the salinometer has a temperature compensation feature, the temperature of the interstitial water

should be measure prior to the salinity measurement and the salinometer adjusted accordingly.

Salinity of the interstitial water may also be measured indirectly from the measured conductivity and temperature of a sample. The conductivity meter should be calibrated prior to use with a known conductivity standard (e.g., in μS/cm) close to the conductivity expected at the sampling site and temperature measured prior to the conductivity measurement. Conductivity and temperature measurements may be used to calculate salinity according to methods outlined in Standard Method 2520B (APHA 1985).

REFERENCES

APHA. 1985. Standard methods for examination of waste and wastewater. 16th Edition. L.S. Clesceri, A.E. Greenberg, and R.R. Trussell (eds). American Public Health Association, Washington, DC.